sumer becoming the sole producer of a material vital to that line of manufacture. When expert scientific knowledge is involved it is well that scientific men be alive to the consequences of certain lines of activity.

Four years ago this country imported annually about half a million dollars worth of optical glass, chiefly from Schott in Jena, Mantois in Paris and to some extent from Chance in England. At the outbreak of the war the German supply ceased, while the French and English supplies were limited to that not required for war purposes. Six of the large consumers of optical glass, a government bureau and three glass manufacturers at once started experimental work in this country on the manufacture of optical glass. The entire normal demand for this material is barely sufficient to pay overhead and a modest profit to a single manufacturing concern. But two of these would-be producers have faced the very considerable development expense and brought their production to a factory basis. One of them is a large consumer of optical glass, the other a large manufacturer of plate glass.

The situation faced by the independent consumer is a difficult one. He naturally can not depend upon his largest competitor for his raw material. Neither can the plate-glass manufacturer be depended upon as a permanent source of supply since his large orders for his regular product are much more remunerative. The outlook is therefore rather dismal both for the independent consumer and for the future manufacture of optical glass in America.

Optical glass manufacture, like so many other industries newly taken over in this country, is extremely sensitive to the favor of the capitalist as well as of the scientific expert and skilled laborer. Optical glass has been successfully made in this country in small experimental batches at various times for at least thirty years back, but no one would risk the necessary capital in a business with a demand so circumscribed and a margin of profit so limited. At present a concern devoted exclusively to optical glass, booking the entire American demand might weather the return to normal trade conditions. With the business split into at least two parts, one chief producer a large consumer, another operating it as a trivial side issue, the industry is unlikely to survive.

P. G. NUTTING

PITTSBURGH,
October, 1917

A NOTE ON THE "AGE AND AREA" HYPOTHESIS

PROFESSOR DEVRIES'[1] recent endorsement of the hypothesis advanced by Willis that the range of any plant, barring barriers, depends upon the age of the species, is a most curious illustration of how uncritical a man becomes who is obsessed with a theory. The Willis hypothesis has already been satisfactorily dealt with by Sinnott[2] in the pages of SCIENCE and I wish only to add one or two brief comments.

Neither Willis nor DeVries appear to have any knowledge of or interest in the facts of paleontology, certainly the latter, since he is an evolutionist of a sort, might have selected a name for his supposed factor that had not already been used in a perfectly definite way for a process diametrically the opposite of saltation. This has all been well said by former critics and I mention it in the present connection merely as more cloth off the same piece as the adoption of the Willis hypothesis.

Regarding barriers, we are familiar with certain gross kinds such as mountain ranges and seas, but who can successfully formulate the interrelations of organisms with one another and with their environment and the less obvious but no less real barriers that result from these correlations? One is reminded of Darwin's classic explanation of the relationship between cats and red clover, in which case spinsters might prove an effective barrier to field mice and offer optimum conditions for the spread of clover.

With reference to New Zealand, a philosophic botanist would have to account for very many plant radiations of different ages and from different directions—certainly the

[1] SCIENCE, N. S., Vol. 45, pp. 641–642.

[2] SCIENCE, N. S., Vol. 46, pp. 457–459.

present flora of New Zealand can not legitimately be postulated as having entered that region as a unit at the central point advocated by Willis, nor can the flora of any region as a whole be dated from one period of time or from a single geographical point.

Finally the statement that the dying out of species is a rare event is overwhelmingly opposed by all of the facts of paleontology and by all of the facts of history unless its adherents are prepared to accept the Mosaic cosmogony. This comment is as true of vertebrate and invertebrate paleontology as it is of plants. In the case of the last the probability is very great that the present flora of the globe represents a minute fraction of the extinct floras. Pointing in the same direction is the well-authenticated fact that in all the orders of plants that are prevailingly arborescent the geologic distribution where it is known is found to have been more extensive than the present distribution. The same statement is true of the higher animals and of such invertebrate groups as I am familiar with.

So-called monotypic genera, whether plant or animal, at least in the majority of cases, are relicts of a once wider distribution. Among plants this is strikingly true of arborescent forms and needs qualification only in the case of certain mainly herbaceous, relatively modern and prevailingly temperate groups such as the Papilionaceæ, Labiatæ, Scrophulariaceæ, Plantaginaceæ, Valerianaceæ, etc.

Edward W. Berry
The Johns Hopkins University

SCIENTIFIC BOOKS

A Text-book of Sanitary and Applied Chemistry; or, the Chemistry of Water, Air and Food. By E. H. S. Bailey, Ph.D., Professor of Chemistry, University of Kansas. Fourth Edition revised. New York, The Macmillan Company. 1917. Cloth. 12mo, xxiv + 394 pp. Price $1.60.

As Dr. Bailey says in his preface, the object of the book is to furnish a text, for the use of students, upon chemistry as applied to the most important topics having to do with daily life in the household. The opening chapters deal with the Atmosphere, Fuels, Heating and Ventilation, Lighting, Water, Sewage, Textiles, Soap, Disinfectants and Poisons. The second half of the book treats of the chemistry of food. The treatment is naturally descriptive only and does not cover analytical processes. Throughout the text there are distributed 197 well selected experiments which will greatly help to fix important facts in the student's mind.

W. P. Mason

SPECIAL ARTICLES

THE UFFINGTON SHALE OF WEST VIRGINIA AND ITS SUPPOSED MARINE FAUNA[1]

At a number of localities in northern West Virginia the Uffington shale of I. C. White[1a] lies at the base of the Conemaugh formation, occupying the interval between the Mahoning sandstone above and the Upper Freeport coal of the Allegheny formation below. It is a dark shale, a portion or the whole of which is sandy and bears plant fossils in abundance. It is variable in thickness, forty feet being about the maximum reported, while over much of the area it is lacking altogether, the sandstone being in contact with the coal. The replacement of the shale by the sandstone is clearly the result of erosion as is indicated by the sinuous contact between the two strata, the shale often varying in thickness as much as twenty feet in a distance of a hundred yards.

In 1871, John J. Stevenson, in a paper entitled: "A geological examination of Monongalia county, West Virginia," by John J. Stevenson; together with lists of fossils and descriptions of new species, by F. B. Meek,"[2] described a "dark colored, fine grained, argillaceous" shale overlying the "Upper Freeport" coal and containing abundant invertebrate fossils. Its thickness is given as 12 feet. It is said to be best exposed in the "bluff bordering the bottoms two or three

[1] Published by permission of I. C. White, state geologist of West Virginia.

[1a] I. C. White, West Virginia Geol. Survey, Vol. II., 1903, p. 323.

[2] West Virginia University, Board of Regents, Third Ann. Rept., 1871, for 1870, pp. 41 to 73.